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Building & Highway Material Testing Laboratory

NABL - Accredited Laboratory as per ISO / IEC-17025 :2005

T-2377

Job No.: CTCE/BBMP/W.No.14/KM/CSR-08/111/QB(BM)/2016-17

08.08.2016

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

*CUSTOMER	:	**Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
*AGENCY	:	**Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
*NAME OF THE WORK	:	Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
REFERENCE	:	BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
*SAMPLE ID	:	Bitumen
DATE OF SAMPLING	:	05.08.2016
DARE OF TESTING	:	08.08.2016

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The results of the tests conducted on the bitumen sample.

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2009)	86	80 to 100
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2009)	44	Min. 40
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2009)	296	Min. 220

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*Information is furnished by the Customer/Representative.

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VISHWANATH. I.A.
Chief Executive Officer

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Job No: CTCE/BBMP/W.No.14/KM/BM/AIV/2016-17

08.08.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
Agency	**Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
Name of the Work	Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
Reference	BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
Source / Location	Hotmix Plant, Bangalore
Type of Mix	Bituminous Macadam
Date of Testing	08.08.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	386	388	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	85	86	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	301	302	
4	Aggregate Impact value = percent fines	22.02	22.16	
	100* (W_2/W_1)%			22.09

Comments:

→ Maximum allowable Aggregate Impact value for Bituminous Macadam is 30%

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Job No: CTCE/BBMP/W.No.14/KM/BM/AIV/2016-17

08.08.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
Agency	**Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
Name of the Work	Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
Reference	BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
Source / Location	Hotmix Plant, Bangalore
Type of Mix	Bituminous Macadam
Date of Testing	08.08.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	395	398	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	95	96	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	300	302	
4	Aggregate Impact value = percent fines	24.05	24.12	
	100* (W_2/W_1)%			24.09

Comments:

→ Maximum allowable Aggregate Impact value for Bituminous Macadam is 30%

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Job No: CTCE/BBMP/W.No.14/KM/BM/Shape.T/2016-17 : 08.08.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	: **Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
Agency	: **Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
Name of Work	: Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
Reference	: BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
Technical Reference	: IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	: Bituminious Macadum
Date of Testing	: 08.08.2016

Civil-Tech Consultants & Engineers Bangalore

Flakiness Index = **11.05%**

Elongation Index = **13.25%**

Result : Combined Flakiness & Elongation index **24.30%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Macadam is 30%

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Job No: CTCE/BBMP/W.No.14/KM/BM/Shape.T/2016-17 : 08.08.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	: **Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
Agency	: **Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
Name of Work	: Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
Reference	: BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
Technical Reference	: IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	: Bituminious Macadum
Date of Testing	: 08.08.2016

Civil-Tech Consultants & Engineers Bangalore

Flakiness Index = **12.30%**

Elongation Index = **13.90%**

Result : Combined Flakiness & Elongation index **26.20%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Macadam is 30%

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Job No: CTCE/BBMP/W.No.14/KM/BM/Stripping/2016-17

10.08.2016

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	**Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
Agency	**Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
Name of the work	Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
Reference	BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
Type of Mix	Bituminous Macadam
Date of Testing	10.08.2016

Type of binder : 80/100

Percentage of binder used : 5.0% by wt.

Total weight of aggregate : 200 g

Total weight of binder : 10.0 g

Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.4	3.50	96.50
2	3.5		
3	3.6		

Comments:

→ Minimum allowable Aggregate retained coating for Bituminous Macadam is 95%

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Job No: CTCE/BBMP/W.No.14/KM/BM/Sp_Wa/2016-17

10.08.2016

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	**Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
Agency	**Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
Name of the Work	Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
Reference	BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
Source / Location	Hotmix Plant, Bangalore.
Type of Mix	Bituminous Macadam
Date of Testing	10.08.2016

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 2	
1	Weight of aggregate suspended in water with the basket	W_1 g	2018	2020	2022	
2	Weight of basket suspended in water	W_2 g	750	750	750	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1268	1270	1272	
4	Weight of saturated surface dry aggregate in air	W_3 g	2013	2011	2014	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	745	741	742	
6	Weight of oven dried aggregate	W_4 g	1999	2002	2000	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.683	2.702	2.695	2.689
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.735	2.735	2.747	2.741
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.70%	0.45%	0.70%	0.70%

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Macadam is 2.0%

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Job No.: CTCE/BBMP/W.No.14/KM/BM/Bitumen/2016-17

10.08.2016

BITUMEN CONTENT DETERMINATION OF BITUMINOUS MACADAM MIX

AS per IRC:SP:-1984

CUSTOMER	**Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
AGENCY	**Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
NAME OF THE WORK	Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
REFERENCE	BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
SAMPLE I/D	8th main & 3rd Cross Bhuvaneshwarinagara Ward No.14
DATE OF TESTING	10.08.2016

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	482	482
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	18	18.00
7. Bitumen content in %	3.60	3.60
8. Average	**3.60**	

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Job No.: CTCE/BBMP/W.No.14/KM/BM/Bitumen/2016-17

10.08.2016

GRADATION DETERMINATION OF BITUMINOUS MACADAM MIX

As per IS2386 and IRC:SP:11-1984

CUSTOMER	**Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
AGENCY	**Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
NAME OF THE WORK	Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
REFERENCE	BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
SAMPLE I/D	8th main & 3rd Cross Bhuvaneshwarinagara Ward No.14
DATE OF TESTING	10.08.2016

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-04 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
26.5	0	0	0	100	100
19	34.25	7.11	7.11	92.89	90-100
13.2	96.36	19.99	27.10	72.90	56-88
4.75	259.3	53.80	80.89	19.11	16-36
2.36	49.23	10.21	91.11	8.89	4-19
0.3	25.25	5.24	96.35	3.65	2-10
0.075	4.16	0.86	97.21	2.79	0-8

Þ The results indicated above are based on the tests carried	Trail 2				Specified Limits as per MORTH specification table 500-04 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
26.5	0	0	0	100	100
19	35.16	7.29	7.29	92.71	90-100
13.2	79.36	16.46	23.76	76.24	56-88
4.75	263.2	54.61	78.37	21.63	16-36
2.36	53.13	11.02	89.39	10.61	4-19
0.3	26.36	5.47	94.86	5.14	2-10
0.075	10.25	2.13	96.98	3.02	0-8

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Job No: CTCE/BBMP/W.No.14/KM/BM/Agg.G/2016-17 10.08.2016

Aggregate Gradation Test

IS : 2386 Part I

Customer	**Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
Agency	**Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
Name of the work	Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
Reference	BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
Sample ID	Hotmix Plant, Bangalore.
Type of Mix	Bituminous Macadam
Date of Testing	10.08.2016

Total Weight of Sample: **5100** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
26.5	0	0	0	100	100	Gradation satisfies Grade-II MORTH specification
19	260	5.10	5.10	94.90	90-100	
13.2	1585	31.08	36.18	63.82	56-88	
4.75	1590	31.18	67.35	32.65	16-36	
2.36	985	19.31	86.67	13.33	4-19	
0.3	350	6.86	93.53	6.47	2-10	
0.075	155	3.04	96.57	3.43	0-8	

Total Weight of Sample: **5150** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
26.5	0	0	0	100	100	Gradation satisfies Grade-II MORTH specification
19	320	6.21	6.21	93.79	90-100	
13.2	1590	30.87	37.09	62.91	56-88	
4.75	1495	29.03	66.12	33.88	16-36	
2.36	995	19.32	85.44	14.56	4-19	
0.3	525	10.19	95.63	4.37	2-10	
0.075	125	2.43	98.06	1.94	0-8	

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QUALITY CONTROL REPORTS FOR

BITUMINOUS CONCRETE

CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

NABL - Accredited Laboratory as per ISO / IEC-17025 :2005

T-2377

Lab No.: CTCE/BBMP/W.No.14/KM/CSR-08/111/QB(BC)/2016-17 09.08.2016

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

*CUSTOMER	:	**Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
*AGENCY	:	**Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
*NAME OF THE WORK	:	Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
REFERENCE	:	BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
*SAMPLE ID	:	Bitumen
DATE OF SAMPLING	:	08.08.2016
DATE OF TESTING	:	09.08.2016

The results of the tests conducted on the bitumen sample.

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2009)	88	80 to 100
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2009)	45	Min. 40
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2009)	302	Min. 220

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Chief Executive Officer

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Job No.: CTCE/BBMP/W.No.14/KM/BC/AIV/2016-17 09.08.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
Agency	**Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
Name of the Work	Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
Reference	BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	09.08.2016

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	379	382	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	80	82	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	299	300	
4	Aggregate Impact value = percent fines 100* (W_2/W_1) percent	21.11	21.47	**21.29**

Comments:

→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%

Note:

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Job No.: CTCE/BBMP/W.No.14/KM/BC/AIV/2016-17

09.08.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
Agency	**Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
Name of the Work	Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
Reference	BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	09.08.2016

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	386	388	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	86	87	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	300	301	
4	Aggregate Impact value = percent fines 100* (W_2/W_1) percent	22.28	22.42	22.35

Comments:

→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%

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Job No.: CTCE/BBMP/W.No.14/KM/BC/Shape.T/2016-17 : 09.08.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	: **Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
Agency	: **Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
Name of Work	: Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
Reference	: BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Bituminous Concrete
Date of Testing	: 09.08.2016

Civil-Tech Consultants & Engineers Bangalore

Result : Flakiness Index = **12.13%**

Elongation Index = **13.85%**

Result : Combined Flakiness & Elongation index **25.98%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.14/KM/BC/Shape.T/2016-17 : 09.08.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	: **Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
Agency	: **Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
Name of Work	: Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
Reference	: BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Bituminous Concrete
Date of Testing	: 09.08.2016

Civil-Tech Consultants & Engineers Bangalore

Result : Flakiness Index = **11.56%**

Elongation Index = **13.28%**

Result : Combined Flakiness & Elongation index **24.84%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.14/KM/BC/Stripping/2016-17

11.08.2016

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	**Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
Agency	**Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
Name of the Work	Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
Reference	BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
Type of Mix	Bituminous Concrete
Date of Testing	11.08.2016

Type of binder : 80/100

Percentage of binder used : 5.00% by wt.

Total weight of aggregate : 200 g

Total weight of binder : 10.00 g

Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.1	3.20	96.80
2	3.2		
3	3.3		

Comments:

→ Minimum allowable Aggregate retained coating for Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/W.No.14/KM/BC/Sp_Wa/2016-17 11.08.2016

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	**Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
Agency	**Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
Name of the Work	Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
Reference	BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
Type of Mix	Bituminous Concrete
Date of Testing	11.08.2016

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	1998	1999	2000	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1239	1238	1245	
4	Weight of saturated surface dry aggregate in air	W_3 g	2023	2024	2025	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	784	786	780	
6	Weight of oven dried aggregate	W_4 g	2010	2013	2012	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.564	2.561	2.579	2.568
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.607	2.597	2.623	2.609
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.65%	0.55%	0.65%	0.61%

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0%

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11.08.2016

Job No: CTCE/BBMP/W.No.14/KM/BC/Bitumen/2016-17

BITUMEN CONTENT DETERMINATION OF BITUMINOUS CONCRETE MIX

As per IRC:SP:11-1984

CLIENT	**Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
AGENCY	**Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
NAME OF THE WORK	Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
REFERENCE	BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
SAMPLE I/D	8th main & 3rd Cross Bhuvaneshwarinagara Ward No.14
DATE OF TESTING	11.08.2016

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	474	473
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	26	27.00
7. Bitumen content in %	5.20	5.40
8. Average	**5.30**	

Note:

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Job No: CTCE/BBMP/W.No.14/KM/BC/Bitumen/2016-17 11.08.2016

BITUMEN CONTENT AFTER GRADATION DETERMINATION OF BITUMINOUS CONCRETE MIX

As Per IS 2386 and IRC:SP:11-1984

CLIENT	**Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
AGENCY	**Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
NAME OF THE WORK	Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
REFERENCE	BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
SAMPLE I/D	8th main & 3rd Cross Bhuvaneshwarinagara Ward No.14
DATE OF TESTING	11.08.2016

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GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-18 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	44.15	9.31	9.31	90.69	79-100
9.5	36.16	7.63	16.94	83.06	70-88
4.75	70.22	14.81	31.76	68.24	53-71
2.36	65.26	13.77	45.53	54.47	42-58
1.18	53.26	11.24	56.76	43.24	34-48
0.6	53.13	11.21	67.97	32.03	26-38
0.3	43.15	9.10	77.07	22.93	18-28
0.15	36.36	7.67	84.74	15.26	12-20
0.075	42.25	8.91	93.66	6.34	4-10

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-18 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	36.36	7.69	7.69	92.31	79-100
9.5	48.25	10.20	17.89	82.11	70-88
4.75	67.15	14.20	32.08	67.92	53-71
2.36	70.22	14.85	46.93	53.07	42-58
1.18	73.13	15.46	62.39	37.61	34-48
0.6	43.13	9.12	71.51	28.49	26-38
0.3	34.15	7.22	78.73	21.27	18-28
0.15	26.36	5.57	84.30	15.70	12-20
0.075	38.25	8.09	92.39	7.61	4-10

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Job No.: CTCE/BBMP/W.No.14/KM/BC/Agg/2016-17 11.08.2016

Aggregate Gradation Test

IS : 2386 Part I

Customer	**Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
Agency	**Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
Name of theWork	Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
Reference	BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	11.08.2016

Total Weight of Sample: **5150** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	JOBMIX Gradation as per MORTH	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per MORTH
13.2	625	12.14	12.14	87.86	79 - 100	
9.5	460	8.93	21.07	78.93	70 - 88	
4.75	580	11.26	32.33	67.67	53 - 71	
2.36	600	11.65	43.98	56.02	42 - 58	
1.18	625	12.14	56.12	43.88	34 - 48	
0.600	530	10.29	66.41	33.59	26 - 38	
0.300	595	11.55	77.96	22.04	18 - 28	
0.150	435	8.45	86.41	13.59	12 - 20	
0.075	400	7.77	94.17	5.83	4 - 10	

Total Weight of Sample: **5250** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	JOBMIX Gradation as per MORTH	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per MORTH
13.2	635	12.10	12.10	87.90	79 - 100	
9.5	455	8.67	20.76	79.24	70 - 88	
4.75	590	11.24	32.00	68.00	53 - 71	
2.36	615	11.71	43.71	56.29	42 - 58	
1.18	635	12.10	55.81	44.19	34 - 48	
0.600	550	10.48	66.29	33.71	26 - 38	
0.300	590	11.24	77.52	22.48	18 - 28	
0.150	480	9.14	86.67	13.33	12 - 20	
0.075	420	8.00	94.67	5.33	4 - 10	

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Job No.: CTCE/BBMP/W.No.14/KM /BC/Stability/2016-17 11.08.2016

TEST REPORT ON STABILITY OF MIX

Customer	:	**Asst. Executive Engineer,** T. Dasarahalli Sub Division, BBMP, Bangalore.
Agency	:	**Sri. Manjula. K,** #381, 23rd Main Road, 2nd Stage, BTM Layout, Bangalore.
Name of Work	:	Improvements to roads and drains at 8th Main and 3rd Cross Bhuvaneshwarai Nagara in Ward No.14, BBMP, Bangalore.
Reference	:	BBMP/DZ/AEE/TDSD/PR/ /2016-17 Dated: 01.08.2016
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Bituminous Concrete
Date of Testing	:	11.08.2016

The results of the tests conducted on the bituminous concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	9.10	9.20	9 Kn (min)
2	Marshal flow, mm	2.90	3.05	2 – 4
3	Percent air voids in Mineral Aggregate	13.05	13.30	13 – 15
4	Voids in Compacted Mix	3.95	4.50	3 – 6
5	Percent Voids filled with Bitumen	68.55	69.60	65 - 75
6	Density, g/cc	2.27	2.28	--

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